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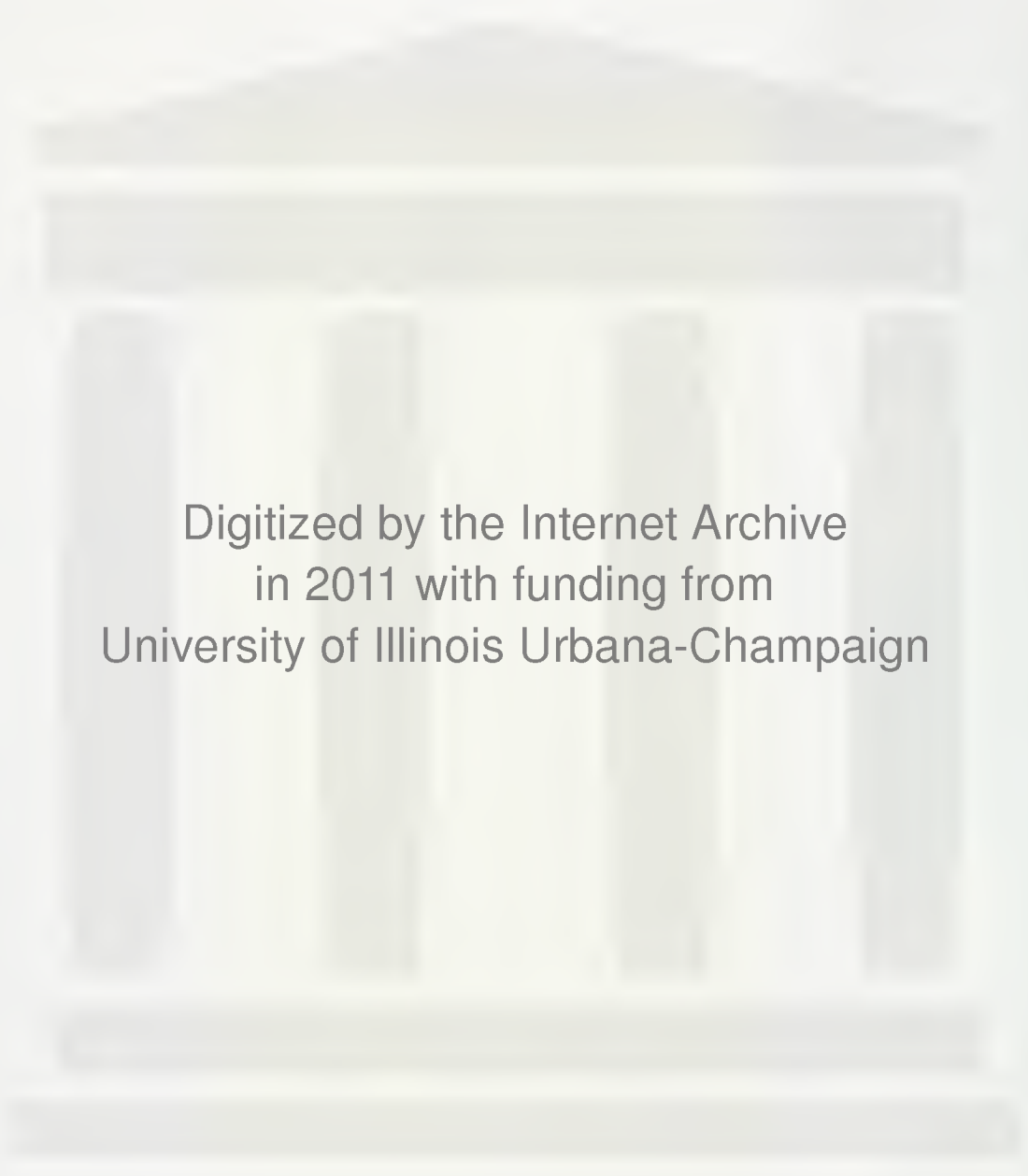
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A HALF CENTURY OF HOUSING IN THE UNITED STATES

V. Lewis Bassie

#405

College of Commerce and Business Administration
University of Illinois at Urbana-Champaign

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June 1, 1977

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A Half Century of Housing in the United States

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The author is grateful for the assistance of all who participated in this research. Unfortunately their contributions are too many to be acknowledged in detail. Foremost are those of Helen Lowry whose efforts resulted in improvements of every part of the project. At an earlier date, the work of Sally Ferguson was outstanding. Also deserving of special mention are Josephine Chan, Paul King, Wilberta Stone, and Robert Wolff.

Abstract

Residential construction is notoriously unstable, but the single extreme cycle of the interwar years is in strong contrast to the multiple short cycles of the period following World War II. However, both patterns of variation may be explained by basic supply-demand factors in the housing market, by variables transmitting the impacts of fluctuations in other parts of the economy, and by government programs aimed at keeping building activity high.

A Half Century of Housing in the United States

Lack of stability in the housing market makes it the source of continual controversy. As home building swings in periodic surges and setbacks, there is always some new difficulty to be remedied. The resulting program changes have so far gained at best only indifferent success. Those interested mainly in price stability, the inflation fighters, want to put strict limits on government spending and are often willing to sacrifice housing as well as other programs to that end. In contrast, those interested in welfare aspects want more and better housing for everybody and decry shortfalls of any kind, whether they originate in recession or in restrictive policies. The problems of the moment tend to dominate views of what causes residential construction to behave as it does and what remedial policy should be.

Observers familiar only with the records of the period since World War II tend to view fluctuations as temporary departures from a norm related in some way to household formation and economic growth. These somewhat erratic movements are often described as "cycles" or, alternatively, as movements related to cyclical developments in the general economy; the latter shift funds into or away from the mortgages needed to finance home purchases. In the decline of 1973-75, for example, it is generally held that tight money was the primary depressant, with high interest rates in competing uses draining away the finances urgently needed for recovery in building. At a second remove, inflation is said to be the cause of high interest rates and hence the villain that has cut building activity low. Yet it may be shown that the moderate inflation of the post World War II years through the 1960s

offered firm support to real estate and housing markets. It lifted the home buyer's income and eased his debt burden, and at the same time validated that debt for the mortgage holder, ensuring its repayment or the recovery of capital in the event of resale.

In longer perspective, these short-term explanations appear somewhat superficial. No doubt they contain indications of valid influences in the special circumstances of the occasion, but a more complete account must also explain the other situations in which those influences were clearly inoperative. Basic factors in the use and expansion of the housing stock work their effects out slowly. The extreme durability of houses ensures sustained availability even if new construction should for a time cease entirely. The maximum levels of building in any single year are adequate at best to increase the total stock available by only a small fraction of the units already on hand. So the influences relating to the position of stocks are persistent and tend to carry through the more volatile year-to-year changes resulting from other factors.

From the policy point of view, any programs adopted should look toward longer-term results and not just aim at dealing with some immediate crisis. This implies analysis of all the causal influences over a period long enough for their impacts to be fully worked out, and this in turn requires data consistent in concept and substantially accurate over a long period of years. Research was undertaken to develop such a data base and point out its implications for the current situation. An approach to these objectives is described in the remainder of this paper.

Cyclical and Other Factors in Home Building

The patterns of variation in housing starts depend on the character of the general economic situation as well as on a complex of factors specific to the building and utilization of the housing stock. Nowhere is this better seen than in the contrasts between housing activity in the interwar years and in the period since World War II. (See Chart 1.) In both periods, the variation may be described as cyclical, but there is otherwise little similarity in the patterns revealed.

The fluctuations from 1920-41 would be readily identified by everyone as a major cycle. Following the end of World War I there was a rise to the 1925 peak, and this was followed by eight years of decline and eight years of advance from the 1933 trough. The movements through each phase were extraordinarily smooth and the amplitude of these movements was extreme-- a decline of almost 90 percent from the high as the building industry ground to a halt in the great depression, followed by a tenfold recovery to a new high in 1941. In the late 1930s, one could say, "Construction is the most stable and yet the most widely fluctuating segment of the whole economy." The elements of truth in this statement depended on time perspectives: in the short run, there was little change from one period to the next, but in the longer span of a half cycle, the variation was tremendous.

This kind of cycle may be regarded as a special inventory cycle made extreme in amplitude and in duration by the inflexibility of the industry and the durability of its products. In this interwar period the cycle represented the operation of a market unimpeded in giving effect to its own internal forces and reinforced by related movements in other economic sectors. In the various phases of such a cycle there is a rush to correct any deficiency that

happens to develop, and production expands to a rate that cannot be sustained by long-term needs. Then after a while production has to be cut back to bring it into line with those needs and this cutback brings on the decline. The decline in turn overcarries, a deficiency again develops, and a new cycle gets under way. Thus, the housing cycle both reflected and made a contribution to the overall economic fluctuations of which it was a part.

The extreme nature of this cycle may be regarded as an outgrowth of World War I. The greater the disturbance that sets the cycle in motion, the greater the imbalances that have to be corrected in each stage. The wartime conditions created backlogs of demand for housing and accumulations of financial assets to make that demand effective. This led to excessive rates of investment; the economy had to overproduce to remedy the pre-existing deficiency. The result was that in the course of time overproduction led to market saturation. Then the decline set in, and during the downward phase of the cycle cumulative interactions of excessive stocks and falling building activity resulted in overcorrection on the downside. A major war inevitably creates so great a disturbance that the cycle must be long drawn out and the amplitude of its swings exaggerated.

It may be noted at this point that the recovery to the early 1940s shown on Chart 1 is substantially greater than was indicated by the old series of housing starts. This is partly a matter of statistical revisions, as will be explained in the next section. There were also two special influences: First, there were the beginnings of government intervention in the housing market. In the 1920s, mortgages typically provided for current interest payments and final full payment of principal after a fixed term to maturity. Many home owners had hoped to make the repayment of

principal easy by putting their savings in the stock market, often on minimal margins. After the crash on 1929, these "savings" were gone, and there was nothing to bail out the home owners who were in default. Foreclosures arose to unprecedented highs. In that uncontrolled market, the years of prosperity that had piled up housing stocks and mortgage debt culminated in a situation in which the excesses had to be worked off through years of depression.

As depression measures, the government set up the Federal Home Loan Bank and the Home Owner's Loan Corporation to minimize the displacement of owners from their homes. Subsequently, other housing programs were enacted. Slum clearance and public housing programs were designed to speed recovery. Mortgage insurance was introduced to encourage lenders to make long-term loans on small houses at low rates of interest. Under the Housing Act of 1937, tax exempt local authorities were given substantial powers in the federal guaranty of their finances. The new style in mortgages put the loans on the monthly repayment plan since the monthly payments were relatively small on long-term loans, the distinction between renting and owning a home became somewhat blurred.

The second special influence on the pre-war recovery was the beginning of World War II in Europe in 1939. Developments there led to expansion of armaments production here, and this spread through related industries, such as steel, and to some extent affected building, especially in areas where the contributions to economic recovery were greatest.

Even without the special influences, however, the recovery phase of

¹Paul F. Wendt, Housing Policy, University of California Press, Berkeley, 1963.

the cycle was well under way and would in all probability have progressed to new peaks. After the U.S. entered the war toward the end of 1941, the upswing was interrupted because the demands of military procurement were overriding. All construction not judged to be essential to the war effort was banned. The building cycle was not dead, however. It was merely suppressed for awhile. Recognition of this fact led some analysts to a correct forecast of the building upswing in the early post-war years, at a time when some other analysts were projecting a downward phase of the prewar cycle. Newbury, for example, warned against "mechanically repeating the average or normal cycle" and stated that "it is not necessary to project the building cycle in practical forecasts beyond the current or prospective half-cycle, nor is it wise to do so." (Business Forecasting, McGraw-Hill, 1952, p. 138)

Proceeding now to the years following World War II, the picture looks altogether different. After the immediate post-war high was reached in 1950, there was little distinct trend and nothing that could be described as a major cycle, though this ignores the possibility that a great post-war cycle has not yet gone into its depressed phase. The fluctuations around a more or less constant level not far from 1.5 million starts per year were seemingly rather erratic.

Nevertheless, the cycle builders could find a great deal of consistency in these fluctuations, speaking, for example, of "three housing booms" in the 1950's.² To illustrate further, the dotted lines on the chart show that the movements conform fairly well to a fixed cycle of four and one-half years duration, with the cyclical highs at an annual rate of 1.65 million

²Miles, Colean, Quarterly Economic Report of the Mortgage Bankers Association, No. 4-59.

starts and the lows at a rate of about 1.25 million starts. This range of about 25 percent of the average cyclical peak is certainly a significant degree of variation, but it has little of the economic impact of the 90 percent decline to the 1933 low.

From a more general analytical point of view, however, the validity of such a short cycle may be questioned. Each of these movements resulted from a variety of factors that could only in part be considered cyclical in nature. Some were in the nature of disturbances, others reflected general economic developments that reacted on housing, and government intervention constantly sought to expand or sustain activity. Throughout, real estate and construction activities were aided by the growth in the economy and recurrently by international disturbances, though these at other times had depressing effects. After the wartime backlog had been worked off by the mid-1950's, government support and the continued growth of the economy tended to counteract downside cyclical forces and sustain the level of building activity through the 1960's.

The upsurge to the 1950 peak was the usual strong cyclical response to a postwar situation. It was strengthened by the baby boom of the late 1940's. The ability of affluent families to relocate and the high population mobility associated with the discharge of the armed forces were also important. Even the Korean War contributed a little in the 1950's. All through these early postwar years, pegged interest rates facilitated mortgage financing.

The decline from this peak more definitely reflected the impact of the Korean War. Direct restrictions were imposed on some building, and interest rates were freed in the Federal Reserve-Treasury Accord of March 1951. Uncertainties concerning building materials supplies were created

by other restrictions, by wide price fluctuations, and by the steel strike of 1952. A moderate tightening of money and the beginning of recession extended the decline through 1953.

Throughout the Korean War period, portions of the backlog of demand persisted and were ready to support recovery. This came with the Housing Act of 1954, enacted as part of government action to counteract the recession of 1953-54. The new legislation provided for a striking change in financing terms. Down payments on FHA loans were reduced and maturities were extended. VA mortgages were put on the easiest terms -- no downpayment and 25 to 30 years to maturity. The increase in new housing starts from late 1953 to early 1955 was very largely accounted for by the increase in government-guaranteed mortgage loans.

By the end of 1955 the backlog had been pretty well eliminated as a special factor, and housing starts began to taper off. Again, new disturbances quickly imposed changes. The Suez Crisis and the Soviet invasion of Hungary created new uncertainties in mid-1956. Monetary tightness developed, driving short-term interest rates above long-term bond rates for the first time since 1929. The decline in housing starts accelerated, and the onset of the 1957-58 recession drove activity still lower.

At the low of the 1958 recession the government again came to the rescue. This sharp recession was particularly disturbing because the Sputnik revealed that the Soviet Union was ahead of the United States in rocketry, spurring efforts to stimulate the economy as well as make up the military deficiency. The housing act of 1958, enacted in April, made available \$1 billion in long-term loans for the purchase of newly built houses with no or very low down payments. This budgetary contribution was

supplemented by a lowering of administrative standards for home ownership. Buyers were attracted by the easy terms and were found creditworthy. A new upswing developed, and starts made a smart recovery to mid-1959 before beginning a gradual retreat that continued through 1960.

Although the decline to a new low in early 1961 was moderate, the Kennedy Administration had just taken over and was eager to ensure recovery. Its efforts initiated the period of activism referred to as the New Economics, culminating in the tax cut of 1964, which boosted housing as well as business investment activity. New housing legislation was passed in 1961 and 1962, and administrative decisions in 1962 not only favored housing in general but aimed at low-income housing and the end of racial discrimination. In 1950, mortgages typically ran for 15 or 20 years; in 1963, terms of 30 years or more could readily be obtained. The subsidies provided were partly direct, such as rent supplements, and part indirect, through tax reductions or financing advantages. For example, accelerated depreciation was improved and this not only made possible recapturing the investment more quickly but was attractive through helping to convert income into capital gains.

Another factor facilitated the recovery, namely the shift to apartment building. It was based upon demands of growing numbers of youths without close family ties and of elderly persons living on social security or other pensions. From a beginning in 1959, the building of multifamily units took over the burden of cyclical variation during the 1960s; they rose to over 35 percent of the total in 1964, dropped back to 30 percent in late 1966, and soared to 45 percent in 1968.

The sharp setback in 1966 resulted from the Vietnam War and the "credit

crunch" of that year. The buildup of military activity led to a strong spurt of inventory accumulation on top of the necessary expansion of production. The Fed, fearing the inflationary impact, held the money supply almost stable for a half year and drove interest rates sharply higher. Funds flowed into business channels, and mortgage lending was depressed. With the minirecession of early 1967, policy was eased, and recovery in housing accompanied the resumption of the general upswing.

The effects of fiscal and monetary policy have clearly been important in the relatively short swings described as housing cycles in the period since World War II. The actions taken, however, do not coincide with anything inherent in the housing market itself. What this experience reveals is a constant tendency to use fiscal or monetary measures to spur housing whenever the economy begins to falter, and even on some occasions to prevent the effects of competition in other sectors from hurting building activity too much. Policy could not see the merit of making one industry responsible for the whole task of stabilization and leaving its resources unemployed when they could be doing useful work. Some analysts have interpreted this as meaning that the housing cycle is contracyclical to the broader cycles in the overall economy. However, the latter themselves are very irregular and reflect a multitude of diverse causal elements, some of which are merely disturbances.

For all these reasons, the appearance of a short housing cycle of about four and one-half years' duration may be judged artificial. The periodicity of disturbances is certainly coincidental. World War II resulted in so major a housing depression that those years have to be excluded from the analysis. The housing declines of 1951-52 in the Korean period and of 1966 in the

Vietnam period have some similar elements but are so limited in magnitude and duration that they may well be attributed to noncyclical causes. There is nothing in the processes of creating, financing, and using houses or in the position of stocks relative to the demographic variables to suggest that the observed patterns could arise from causation within this sector itself.

The basic question, therefore, is whether the major housing cycle, as it was experienced in the inter-war years is dead, completely a thing of the past. The experience of a half-century seemingly reveals two different phenomena. It poses the question, How much have the causes changed? Answering this question is the goal of the following analysis, but before proceeding, some consideration must be given to the suitability of the data which are to be used.

Housing Starts, 1920-1970

During the 1950's research on housing inventories and activity indicated that the then existing series on housing starts was seriously in error. The underestimating of starts had begun much earlier, and it mostly represented a cumulating bias. The main source of information in compiling the estimates was the number of building permits issued in permit-issuing places. These estimates were too low because the process which has been variously termed urban sprawl and suburban spread had put an increasing proportion of homebuilding into unincorporated, non-permit-issuing areas. The resulting underestimation was therefore progressive. However, since the Bureau of the Census had been taking steps to analyze the deficiency during the first postwar decade and had corrected the current estimates, the remaining deficiency for the 1950's showed a reverse progression. By 1960 the Bureau was ready with some revisions and with a new series for

1959 and subsequent years.

In 1964, with the results of the 1960 Census available, an interpolation formula was used to correct the starts data back to 1945.¹ In percentage terms, the adjustments rose from 11 percent in 1959 to 40 percent in 1950 to 46 percent in 1945. This major revision lifted the postwar peak year, 1950, from 1.4 million units to 1.95 million. Revisions were not, however, carried back into the prewar years. This revision for 1945-59 was in effect an inverted adjustment resulting from earlier improvements and revisions.

There were clear indications in the basic Census reports as well as in the less well established data relating to other aspects of the situation that the earlier accepted estimates of housing starts deviated in a pattern that may be broadly characterized as follows: The degree of underestimate was relatively small in the 1920's; it accelerated sharply in percentage terms with the onset of the Depression; it reached a peak during the 1940's, when attention was centered on the more pressing problems related to World War II; and improvements were effected after the War and especially during the late 1950's to reduce the discrepancy to something like negligible proportions.

Establishing Decade Benchmarks. As a starting point in the present effort to make the earlier data comparable with the new, the household data of the decennial censuses were taken as basic benchmarks, with the breakdown into farm and nonfarm being maintained over the entire period. From these data as basic points of

¹Dennis, S., "Revised Estimates of New Nonfarm Housing Units Started, 1945-1958", Construction Reports.

reference, a corrected series of decade totals was derived in a two-way approach that involved the reconciliation of changes in stock with components of change. For this purpose past studies and existing data were utilized as fully as possible. During the early decades, data are weakest, so estimates of the components of change (construction, demolitions, conversions, and farm shift) had to be revised and adjusted to force consistency with changes in the stock of houses available (occupied and unoccupied, farm and nonfarm) that were in part similarly adjusted. This cross checking in terms of the inherent relationship between the changes computed from the two data sets here provides the only assurance of accuracy possible in view of the absence of firm source data.

The initial stage aimed at obtaining estimates for conterminous U.S. from 1920 to 1960 on the old definition of farms. These estimates were then adjusted to include Alaska and Hawaii by simple ratio procedures; the latter do not take differential growth rates into account but any errors they introduce are negligible in the totals; and the starts data were blown up by a monthly set of correction factors which would bring them to a level comparable with the new series, including the revised data for 1945-1959.

The translation of household data to houses available required estimates of the number of vacant units. Unoccupied may be preferred to vacant because in some contexts "vacancies" refer only to units available for sale or rent, whereas seasonal, dilapidated, and units rented, sold, or held off the market had to be included. The recent censuses provide stock figures that could be used directly, subject only to some adjustments for such things as timing, changes in definition, and in number of states. The backward projection of the rates for various kinds of vacant units is shown in table 1. The rates

in three of the four subclasses seem to follow fairly well established trends; the last is based on Wickens' description of the housing shortage in 1920.² The net result is an overall rate rising from a low of 5 percent in 1920 to a high of 9.4 percent in 1930, followed by subsequent fluctuations within this range.

An extension of this process was necessary to obtain separate rates for farm and nonfarm units. In years where data are available, they indicate that the rural rates were always higher, and since the nonfarm units are more numerous, the farm rates are always farther from the average. The differentials became more extreme in 1960, as a result of the strong postwar movement toward urbanization. Since separate reporting of farm and nonfarm vacancies was then discontinued with the change in definition of farms, the estimates were made for comparative purposes, to judge the plausibility of the results.

The stock figures obtained in this way are shown in Table 2 after adjustments to include Alaska and Hawaii. The continuation of this table under the heading "New Farm Definition" shows the most recently published Census data. With the changes in number of farms and in nonfarm residences over the years, with the greater mobility of the population, the industrialization of rural areas, and opportunities for farmers to earn off-farm income, the old distinctions became blurred. As a result, it became logical to consider rural vacancies to be nonfarm units. Nevertheless, the new definition of farms in terms of money values of output creates difficulties.

²Wickens, David L., Residential Real Estate, New York, National Bureau of Economic Research, 1941.

Maintaining comparability over long periods of time is hardly possible, and new problems will continually arise from changes in rates of inflation.

For the present study, any definitional adjustments for the periods before World War II are indeterminate. The social and economic changes that came later were only then beginning to appear, and trends were disturbed by the Great Depression. Note that the farm housing stock was relatively stable from 1920 to 1940, rising only 3 or 4 percent in each decade. A stable definitional change would therefore produce only small decade differences in the farm sector, which in turn is fractional in comparison with the nonfarm sector.

Evaluating the components of change began with construction. The procedure adopted for farm as well as nonfarm units was as far as possible similar to that used by Naigles^{2a} for the 1930's and Dennis³ for 1945-1959. For the early 1940's, the linkage to Dennis' estimate for 1945 was relied on, since it could be assumed that the percentage error in 1940-45 would be more or less symmetrical with that during 1945-49. (However, the first two of these later years as well as the earlier war years were too seriously disturbed to be included in the subsequent analysis.) For the 1920's, the estimate of 7,497,000 units made by Blank⁴ was taken as the basis for the initial estimate. He indicated that no available estimate could "be demonstrated to be clearly superior." This is correct, but the evidence on the subsequent pattern of adjustment analysis in relation to the other components

^{2a}M. H. Naigles, "Housing and the Increase in Population", Monthly Labor Review, April, 1942, pp. 869-80.

³Op cit., p. 14.

⁴D. M. Blank, The Volume of Residential Construction, 1889-1950, Technical Paper 9, National Bureau of Economic Research, Inc. 1954, p. 59.

of change suggested it should be raised a little, by about 200,000 units, or 2.6 percent, including the adjustment for Alaska and Hawaii. This has to be allocated primarily to the closing years of the decade in order to prevent a growing discrepancy with the Bureau of Labor Statistics series in those years.⁵

Estimates of nonfarm demolitions and other losses are also available from earlier studies. Chawner's estimate of 700,000 units for the 1920's⁶, Naigles 397,000 for the 1930's⁷, and Riley's 600,000 for the 1940's⁸ are all rough estimates but appear to be usable without adjustment. They were subject to careful review from both empirical and theoretical points of view and stand up remarkably well. Demolitions were related to the stock of houses and to the volume of new building activity, which typically requires site clearance. On this basis, the estimates for all decades fall reasonably in line. Although Riley's estimate for the 1940's is somewhat on the low side in terms of the criteria for the other decades, this may be attributed to wartime conditions and the postwar housing shortage.

In the last two decades, mobile homes have come to show substantial effects on the overall housing picture. Costs of conventional housing units have risen so sharply that the mobile home alone provides a reasonable alternative, especially to young and low-income families whose required location is within a reasonable distance from a trailer park. So they can hardly be

⁵ This problem was recognized by Manuel Gottlieb in Estimates of Residential Building, United States, 1840-1939, Technical Paper 17, National Bureau of Economic Research, 1964, p. 62.

⁶ L. J. Chawner, Construction Activity in the United States, 1915-37, (?) Department of Commerce, 1938.

⁷ Op cit., p. 880.

⁸ H. E. Riley, "Change in the Nonfarm Housing Inventory, 1940-1950," (mimeo) U.S. Bureau of Labor Statistics, 1952.

left out of account in future analyses of the housing situation. Still, the picture here remains murky because mobile homes have not been taken seriously until the last few years. Thus, they are reported as dwelling units only if they are occupied; they need not be demolished to be removed from the stock, merely put aside for future occupancy. Hence, estimates of this part of the housing stock have to be related to households, and the data on production and shipment are of limited value.

The census of 1960 reported some 550,000 households in mobile homes. The comparable figure for 1950 was 315,000. However, 1950 was a year of housing shortage and great population mobility, so the number reported probably included many units of less than standard quality for regular living. Partial data from other sources suggest that the decade increase in fully equipped units was close to 400,000, more than half again as many as the difference between the 1960 and 1950 figures in the census report. Estimates for earlier decades are guesstimates that take some account of social and industrial conditions and are subject to the constraint that the cumulative total must come to 550,000 units in 1960. The census reports for 1970 give a clearer picture and also show the units classified as farm dwelling places. The increase during the 1960's may therefore be calculated as the increment over 1960 (adjusted for timing) and also provides a basis for splitting the over all increases between farm and nonfarm units.

Farm dwelling units also complicate the analysis in two other ways -- by making necessary estimates of population moving off the farms and by changes in definition. The latter has already been discussed (p. 15). The former reflects the long term trend toward urbanization which has produced

an almost continuous shift of housing units from farm to nonfarm usage, thus raising the nonfarm stock. This shift must be estimated from the farm data, which are in many respects more sketchy than the nonfarm data. Construction, demolitions, and mobile homes play a part in this process. Conversions are assumed to occur entirely in the nonfarm sector. The methods for estimating farm construction were as far as possible similar to those for nonfarm construction. In this way, estimates for all decades except the 1920's were obtained. The backward projection of these to 1920 were made in conjunction with those for farm shift; although the latter could hardly be considered accurate, they were nevertheless given considerable weight in determining final results, since the construction estimates also had to be rather crude.

Farm demolitions were estimated by applying nonfarm rates to the beginning stock and adding one-fourth of the available mobile farm homes. Taking the same proportion of the beginning stock for farms as for nonfarm demolitions itself gives higher average demolition rates, since the farm stock was basically stable or declining and the nonfarm stock was advancing. The increasing mobility of the population, with the flow toward urban areas suggests that a still higher average rate of demolitions on farm houses is appropriate. The use of mobile homes for farm houses does not directly displace older, immobile units in other locations but increases the probability that such units were abandoned and removed from the housing stock.

The estimates of "Conversions and other" represent a kind of catch-all to cover changes in the nonfarm stock that could not be otherwise estimated. Like demolitions, conversions to other usage tend to be high in periods of peacetime prosperity. The demand for space by new businesses rises, and full

employment with rising incomes enables many families to abandon unsuitable or makeshift quarters in favor of newly constructed units. For these reasons, in the prosperity years from 1923 through 1929, conversions were assumed to bear a similar relationship to the housing stock and to construction activity as in the 1950's. However, there tends to be a counter movement in out-of-scope units, including trailers. During depressions, households set up in cabins, shacks, barns, garages, and other substandard shelters, and the need for conversions dwindles for lack of other demands. This more than offsets the removal of units by conversion, so that in the 1930's, the contribution of the conversions item was positive. During the 1940's, the situation was more complex, but the restriction of building during the war led to similar expedients for utilizing shelter of a temporary character, again including trailers.

On the whole, therefore, the overall movement in the conversion category is somewhat inverse to new construction, and taking this into account along with the indications from partial data in the studies cited, estimates for the 1930's and 1940's were made. In contrast to the farm shift, which made a strong reversal from the 1930's to the 1940's, conversions held to much the same level until the beginning of the postwar building boom.

Any such effort to adjust the housing data back through 1920 obviously involves a process of estimating that cannot be wholly justified. The author, like others before him, must rest his case on the grounds that the procedures described result in a set of data of the right order of magnitude, significantly better than the previously existing data, which are themselves estimates whose accuracy is qualified.

From Decade to Annual Estimates. The translation of the decade estimates of components of change into corresponding annual series requires the use of interpolation procedures. For most of the components, some kind of related data are available as the basis for reasonable estimates of year to year changes. Even in the case of conversions and other, logical patterns are available by applying principles similar to those governing the behavior of the other components. The total of houses available is derived by summing the components, and since these add up to the overall changes derived from the data for the census years, the end points of each decade coincide with the benchmarks already described.

The most important component of change is new construction, and for this component the best interim data also are available in the previously published Bureau of Labor Statistics annual series on nonfarm housing starts. To bring this series into line with the new benchmark estimates, correction factors were derived from the decade ratios of the new series to the old. These correction factors were computed as a single continuous interpolation in the form of a fourth degree parabola such that:

$$NFHS_a = (a + bt + ct^2 + dt^3 + et^4) NFHS_o$$

where the adjusted starts ($NFHS_a$) are obtained from the original ($NFHS_o$) by multiplying by the values of the curve calculated for corresponding years.

The curve was made (1) to coincide with the Dennis correction for 1945; (2) to match the average ratios for the three periods 1920-29, 1930-39, and 1940-44, the last being derived as the decade total less the already adjusted data for the years 1945-49; and (3) to start out level at the beginning in 1920⁹. The correction factors and results are shown on Chart 2. It will be noted that after the initial slow start, the curve is substantially

⁹The methodology for this kind of interpolation is discussed in V. Lewis Bassie, *Economic Forecasting*, McGraw-Hill, 1958, pp. 89-91 and 653-661.

linear from 1925 to 1945. This method preserves most of the year-to-year pattern of changes shown by the earlier BLS data. Those data were carefully prepared and are of substantial validity in indicating short-term changes that are best preserved as far as possible in the new series.¹⁰

In absolute numbers, the present corrections were significantly large mainly in the late 1930's and early 1940's. Numbers of starts in the depression trough and in the war years were very low, so that even large percentage adjustments produced only small absolute changes. The results for 1942-46 are in any case of very little significance since the data for those years have to be left out of the subsequent correlation analysis because of the distorting effects of wartime controls.

Treating the annual starts data as construction completed by the April census data is fully justified in years when apartment building is very limited. It has some effect in shifting units into the years when apartment completions building starts are high because of these larger projects average nine to twelve months. However, the errors are small, being a fraction of a fraction and in no year so much as 0.5 percent of the nonfarm stock. Subsequently, the discrepancy is further reduced when the April data are interpolated back to January; this final adjustment is of course completed only after construction and the other components of change are combined to obtained overall totals of changes in houses available as of April.

Annual estimates of demolitions were computed as a function of total houses available at the beginning of the year in millions of units (HAVL) and total annual construction in billions of constant dollars (TCD). Some

¹⁰See Dorothy K. Newman, "Estimating National Housing Volume", Techniques of Preparing Major BLS Series, Bureau of Labor Statistics Bulletin No. 993, 1950.

losses occur as the result of natural causes, such as fires, floods, and tornados; these relate primarily to the number of units in existence. Others are brought about mainly in the clearing of sites for new construction, whether rebuilding of blighted areas, expanding commercial and industrial facilities, or opening corridors for new highways. The regression of demolitions on HAVL and TCD gives a very good fit ($R^2=.994$), and the calculated values were then further adjusted by interpolations making them conform exactly to the decade averages. The results are shown in part A of Chart 3, where the decade averages are portrayed as short horizontal lines. The climb from the wartime low of 1945 to the 1969 high of over 400,000 units was almost uninterrupted.

The estimates of conversions and other are pure interpolations with patterns of movement adjusted to the conditions prevailing in each decade. In general, the net effect of conversions, mergers, and other causes, known and unknown, tends to show movements inverse to those of new construction. Like demolitions, they impose maximum losses during periods of high prosperity. Unlike demolitions, they make positive contributions to available units when construction activity is restricted, as in depression or war years. The estimates are shown in part B of Chart 3. Any inaccuracies in them are more likely to derive from the catch-all nature of the decade estimates than from the smooth, interim effects of the interpolation curve; to the extent that the former are accurate, the latter are not likely to introduce substantial errors in the year-to-year totals of houses available.

The interpolation of increases in mobile houses was based on shipments data less losses calculated from service-life curves showing the percentages

remaining year-by-year after the units were originally put into use. Prior to 1959, shipments had to be estimated by projecting the industry growth curve backwards. The average service lives were lengthened in stages from 10 years in 1949 and earlier to 15 years in 1965-69. The estimates obtained by subtracting losses obtained from these curves from the estimated shipments were then forced by a secondary interpolation into conformity with the decade averages. The results are shown in part D of Chart 3. By 1969, the contribution of mobile homes to the housing stock was clearly important.

All of the componenets so far discussed apply to the total stock as well as to the farm and nonfarm subtotals. The reaminig component, farm shift, affects only these subtotals, reducing the one and increasing the other. The basic farm shift, excluding definitional changes, was calculated as a proportion of farm households. The latter were obtained on an annual basis from Historical Statistics and Current Population Reports, Series P-20 with corrections to put all years on the April basis and make them correspond in decennial years with data on farm households in Table 2. The proportion of farm households shifted were derived from a trend line fitted to the decade estimates for the 1920's and the 1960's. This line was modified by a cyclical pattern covering two decades -- the 1930's, when the rate of shifting was very low, and the 1940's, when it was very high. The 1950's corresponded very clearly to the trend line except in the early years where they had to be joined to the higher rates of shifting that prevailed in the 1940's. The results are presented in part C of Chart 3. The numbers shifting year by year from 1945 onward show a moderate decline as the rising proportion on the trend line are more than offset by the declining numbers of households to which those proportions are applied.

These estimates of the basic farm shift had to be modified as a consequence of the change in definition of farms. A change of this kind is necessarily arbitrary as to timing. The fact that it was made effective in 1960 does not indicate that the changes underlying it were not significant before 1950. On the contrary, it is almost certain that the war and the postwar mobility were definite parts of the picture. The changes -- totaling 1.5 million, made up of 948,000 households and 558,000 vacant units -- were therefore allocated over two decades on straight-line basis. Part C of Chart 3 shows how the numbers shifting during the 1940's and 1950's were raised by this procedure; the average annual shift of 75,300 amounted to a little less than 0.2 percent of the average nonfarm housing stock during this period but adds 60 percent to the shift already computed.

Summing the changes in all these components gives the changes in the total nonfarm housing stock on an annual basis from 1920 to 1970. In the first instance, these changes represent April dating to correspond to the decennial censuses. The resulting nonfarm housing stock estimates were then interpolated back to January to give the beginning of year data desired for further analysis.

Factors Affecting Nonfarm Housing Starts

In analyzing residential construction activity over a half century, it is necessary to take into account all the factors substantially affecting housing starts during this period. A major point to be determined is whether a single set of factors can explain both the major cycle of the interwar years and the shorter term fluctuations of the post World War II period, which also display some cyclical characteristics. For this purpose, the factors may be classified in three groups:

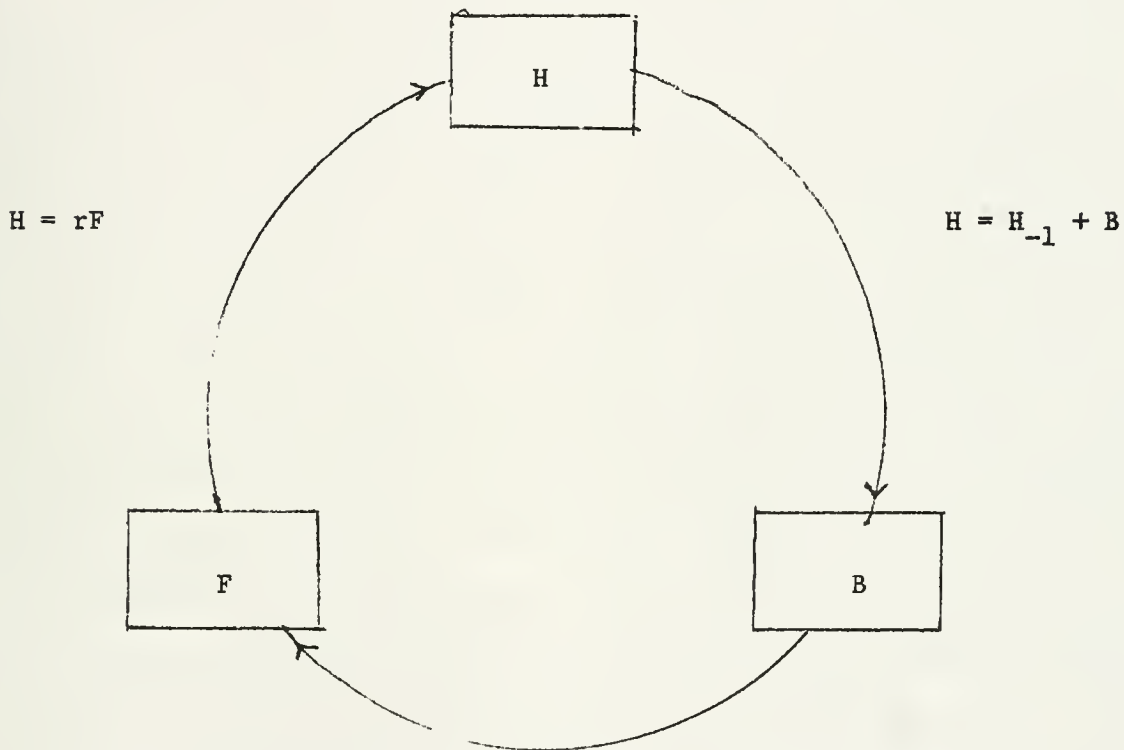
1. basic cyclical factors internal to the housing cycle itself;
2. factors resulting from developments in other parts of the economy that have substantial effects on the housing market;
and
3. indicators of government programs, which are semi-autonomous in character though often enacted in recessions of construction activity.

The basic cyclical forces may be effectively summarized in a stock-flow equation that relates the stock of houses to the flows by which they are created and used up.¹¹ Houses are of course created by building. Losses should be deducted to obtain net changes, but losses are, as already indicated, functions of the housing stock and of building and therefore may be omitted rather than introduced as a separate variable. Houses are used up, or consumed, by providing services over a long period of time. Such services are provided to families, or to individuals living alone who form separate

¹¹The author has demonstrated the applicability of such equations not only to housing but to other kinds of investment. See Economic Forecasting, pp. 662-692. Some additional aspects of the housing cycle are described in the author's Uncertainty in Forecasting and Policy Formation, J. Anderson Fitzgerald Lecture No. 1, University of Texas, Austin, 1959, pp. 25-30.

households. Since the services are provided specifically to the occupants of a dwelling unit throughout the year, the number of families or others occupying the unit may stand as proxy for the services rendered. The cyclical model may then be described by reference to the following diagram:

The Basic Housing Cycle



By combining the two partial equations shown it may be seen that building (representing the change in stocks) is a function of the beginning-of-year stock and the number of families multiplied by a ratio r to indicate the desired level of housing stock. Thus

$$B = a + bF - c H_{-1}$$

This equation states that construction is a positive function of the number of families and a negative function of the stock of houses available at the

beginning of the year. The equation relating F to B is more complex; it involves income as well as investment and is dependent in part on demographic factors. Nevertheless, building itself contributes with multiplier effect to employment and to the number of families whose demand for housing is effective in the market.

To represent the families desiring housing, it is desirable to choose a variable that is not directly affected by rates of building or by the housing stock; the latter, for example would be true of the number of households, in periods when demands for housing have risen sharply and therefore run ahead of the supply. Hence, it was decided to use a variable consisting of married couples plus one half of social security beneficiaries other than married couples and children. The author's earlier study, based mainly on the interwar years used married couples alone as such a variable. However, this variable is clearly too narrow a measure in the period following World War II, since the growth in other types of families or households has been very strong. Old age pensioners, single individuals living alone, including both divorced and never married, and growing numbers of unmarried couples living together have rendered the old family standards obsolete. Many of these households which do not include both husband and wife are dependent upon transfer payments. Others are not, but it is assumed that Social Security beneficiaries can stand as proxy for the whole group. Taking half of the beneficiaries with married couples gives a combined variable that is a relatively constant proportion of total households in all the census years from 1920 to 1970; it ranges from a high of 88.4 percent in 1920 to a low of 85.8 percent in 1940.

The complete cyclical model shown in the diagram explains both the interactions that give cumulative force to the fluctuation of construction--

both in recovery and in recession--and the controls on the amplitude of such fluctuations--both at the peak and at the trough as excesses or deficiencies in the stock of houses develop. The cycle must operate in a broader economic environment and it is accordingly modified by developments in other sectors. F and H_{-1} are important determining factors but they cannot stand alone.

As a measure of the shorter-term business investment cycles, unemployment has several advantages. It reflects both the inventory cycle, which produces the sharpest fluctuations, and the fixed capital cycle, which is of longer duration than the inventory cycle but possibly of even greater influence on employment levels over the intermediate term. Unemployment refers to physical units and in this respect is more nearly on a par with houses and families than are data in money terms, such as income or gross national product. Finally, it only moderately correlated with the basic F and H_{-1} variables in the housing cycle and therefore avoids to some extent the problem of collinearity that would be introduced by another growth variable such as total employment.

Financial stringency also hurts building activity from time to time. Mortgage rates tend to be the most stable in the entire spectrum of interest rates and therefore lose their attractiveness when money is tight. In contrast, short-term rates are the most volatile and may rise above long-term rates in periods when liquidity is low and loan demands are high; these periods are likely to be characterized by cross currents of speculative and involuntary inventory accumulation as well as by tight money as the Federal Reserve Board fights inflation. For these reasons, the differences between short money rates and long money rates are taken as a variable that indicates how building may be affected by financial conditions. Specifically, the rate on 4 to 6 months commercial paper less the rate on Aaa bonds is a variable taken to

measure the effects of competition in money and capital markets; these rates are selected in part because they have been reported over the entire period under consideration.

Housing is the one sector that is really subject to restriction by tight money. The speculative elements in other business demands and the pressures for capacity expansion in boom periods keep commercial and industrial activity at peak rates despite high financing charges. Even the utilities are not deterred because the higher costs get built into their rate structures and are thus passed on to consumers. However, the government is reluctant to let the residential construction carry the burden of restricting the boom, and it constantly designs new programs to prevent extreme declines. These have already been described.

It is difficult to quantify the effects of government action, but a rather crude measure of the impact can be obtained by setting up a dummy variable. Each time a new effort to stimulate building was undertaken a fixed amount is assumed to be added and for reasons already stated these are assumed to be cumulative. Thus, the dummy variable takes the value 0.0 when no new government action has taken place, and it is lifted by 1.0 with each change favorable to home ownership or rental by low-income families. The effects appear to become effective most clearly in the year following the enactment of legislation or stimulative administrative rulings. The following dates for increases have been adopted with reference to the pages on which they are discussed in parentheses: 1938 (5), 1950 (7), 1953 (8), and 1959 (8). This dummy variable progresses in steps from 0.0 in 1937 to 4.0 in 1959 and then remains stable through the decade of the 1960s.

It may be pointed out that this procedure has some large judgmental and rather arbitrary elements. This is not considered a major point as far as the regression results are concerned. Because of the inter-correlation of variables, the estimates are not greatly improved by this measure of government programs, though by the usual tests the dummy variable is clearly significant. What really matters is the degree of confidence one may have in the effectiveness of the actions taken, and from this point of view its inclusion is fully justified. This may be seen even more clearly in the data for the early 1970's. The large subsidies provided in 1971-73 took housing starts to new highs of about 2.5 million units; then after President Nixon cancelled out the subsidies in January 1973, their removal contributed to the sharp decline from the 1973 high to the 1974-75 recession low.

The results of the regression analysis are shown in Chart 4. The equation for estimating nonfarm housing starts is (with t-values in parentheses):

$$\text{NFHS} = -.611 + .206 \text{FDH} - .157 \text{HAVL} + .311 \text{GVAC} - .079 \text{UNEMP} - .112(\text{SM-LM})$$

(1.81)	(6.23)	(6.39)	(5.98)	(5.24)	(2.28)
--------	--------	--------	--------	--------	--------

$$R^2 = .952 \qquad D - W = 1.72$$

These results are highly satisfactory in closeness of fit for a comparatively erratic variable, and all the usual tests of significance are met.

In a number of trials, the results are always consistent for the first three independent variables (families desiring housing, houses available, and government action); for them the signs of the coefficients never vary, and the t-tests always show high significance. On the other two, unemployment and money rates, there is greater variability in the t-tests and with some differences in the data used, the sign of the money rate variable sometimes reverses. The logic of including these variables is not wholly dependent upon the statistical

The first of these is the fact that the system is not in equilibrium.

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results. The latter lend substantial support for it, but the analysis of market relationships dictates that both should be included.

It should be noted that the correlation is somewhat better in the interwar period than in the post World War II period. This results partly from the fact that the standard error of estimate is larger in the later period and partly from the smaller standard deviation of the data, which have been confined to a narrower range of variation. Nevertheless, the peaks and valleys in that period also are fairly well matched, coinciding in seven cases and missing by only one year in the other three. Given the differences in underlying conditions, the stability of the relationships is indeed impressive.

Conclusion

The main conclusion of this analysis is that the basic relationships have not changed through a half-century of experience in home building. The same explanatory factors give reasonably good indications of the rate of building to be expected. In the interwar years, when construction and its financing were mainly controlled by market forces alone, the cycle dominated, and it produced an extreme range of fluctuation. It provides an illustration of how gross investment can fall almost to zero in a depression where no offsetting control measures are in effect. In the years since the end of World War II, the picture is more erratic and at the same time better controlled. This was a period of recurring disturbances and interventions, some of them originating abroad, others at home. The fact that fluctuations were held within a relatively narrow range around a stable level bespeaks the success of measures more or less continuously aimed at preventing the kind of developments portrayed in the earlier period.

It may be inferred that housing will continue to perform in relation to its own basic cyclical forces, to recessions and recoveries in other important parts of the economy, and to the competition for available financial resources. It will also seek and respond to government programs that affect the population's ability to command separate accommodations. The 1948-1970 period represents in effect the finest hours of the mixed economy. The disconcerting disturbances and the growing instability of the 1970's presents it with new challenges, and it remains to be seen if these can be successfully met.

Table 1. Percent of Housing Units Not Occupied, 1920-1960

A. By Type of Vacancy

	Total	Seasonal	Dilapidated	Rented, Sold Held Off Market	Available
1920*	5.0	1.2	1.4	1.2	1.2
1930	9.4	1.5	1.6	1.3	5.0
1940	6.6	1.6	1.5	1.5	2.0
1950	6.9	2.4	1.2	1.7	1.6
1960	9.1	3.0	0.9	1.9	3.4

*Extrapolated backward by type and summed.

B. By Farm and Nonfarm

	Total	Farm	Nonfarm
1920	5.0	6.0	4.6
1930	9.4	9.7	9.3
1940	6.6	7.0	6.5
1950	6.9	10.0	6.4
1960	9.1	11.0*	8.9*

*Old definition of farms.

Table 2. Stock of Dwelling Units U.S. Total, Census Years,
1920-1970¹ (thousands of units)

		Total	Nonfarm	Farm
1920	Total	25,720	18,579	7,141
	Households	24,434	17,721	6,713
	Unoccupied	1,286	858	428
1930	Total	33,114	25,791	7,323
	Households	30,001	23,390	6,611
	Unoccupied	3,113	2,401	712
1940	Total	37,441	29,792	7,649
	Households	34,964	27,851	7,113
	Unoccupied	2,477	1,941	536
1950	Total	46,137	39,773	6,364
	Households	42,969	37,243	5,726
	Unoccupied	3,168	2,530	638
1960	Total	58,326	53,254	5,072
	Households	53,024	48,510	4,514
	Unoccupied	5,302	4,744	558
New Farm Definition				
1960	Total	58,326	54,760	3,566
	Households	53,024	49,458	3,566
	Unoccupied	5,302	5,302	0
1970	Total	68,684	66,283	2,401
	Households	63,445	61,044	2,401
	Unoccupied	5,239	5,239	0

¹Data for all fifty states; ratio adjustments to include Alaska and Hawaii were made for 1920, 1930, 1940, and 1950.

Table 3. Components of Decade Changes in U.S. Housing Stock

	1920-30	1930-40	1940-50	1950-60 (old farm definition)	1960 change in definition	1960-70 (new farm definition)
All Dwelling Units						
Construction	8,592	4,592	8,980	15,471		14,450
Demolitions, other losses	-972	-516	-763	-2,001		-3,617
Increase in mobile homes	10	80	80	380		1,451
Conversions, mergers, etc.	-236	171	399	-1,661		-1,926
Change in: total	7,394	4,327	8,696	12,189		10,358
households	5,567	4,963	8,005	10,055		10,421
vacant units	1,827	-636	691	2,134		-63
Nonfarm Units						
Construction	7,695	3,701	8,396	15,047		14,219
Demolitions, other losses	-702	-398	-602	-1,715		-3,363
Increase in mobile homes	10	60	75	360		1,354
Conversions, mergers, etc.	-236	171	399	-1,661		-1,926
Farm shift	445	467	1,713	1,450		1,239
Change in: total	7,212	4,001	9,981	13,481	1,506	11,523
households	5,669	4,461	9,392	11,267	948	11,586
vacant units	1,543	-460	589	2,214	558	-63
Farm Units						
Construction	897	891	584	424		231
Demolitions, other losses	-270	-118	-161	-286		-254
Increase in mobile homes	-	20	5	20		97
Farm shift	-445	-467	-1,713	-1,450		-1,239
Change in: total	182	326	-1,285	-1,292	-1,506	-1,165
households	-102	502	-1,387	-1,212	-948	-1,165
vacant units	284	-176	102	-80	-558	0

Chart 1 Cycles in Nonfarm Housing Starts, 1920-1970

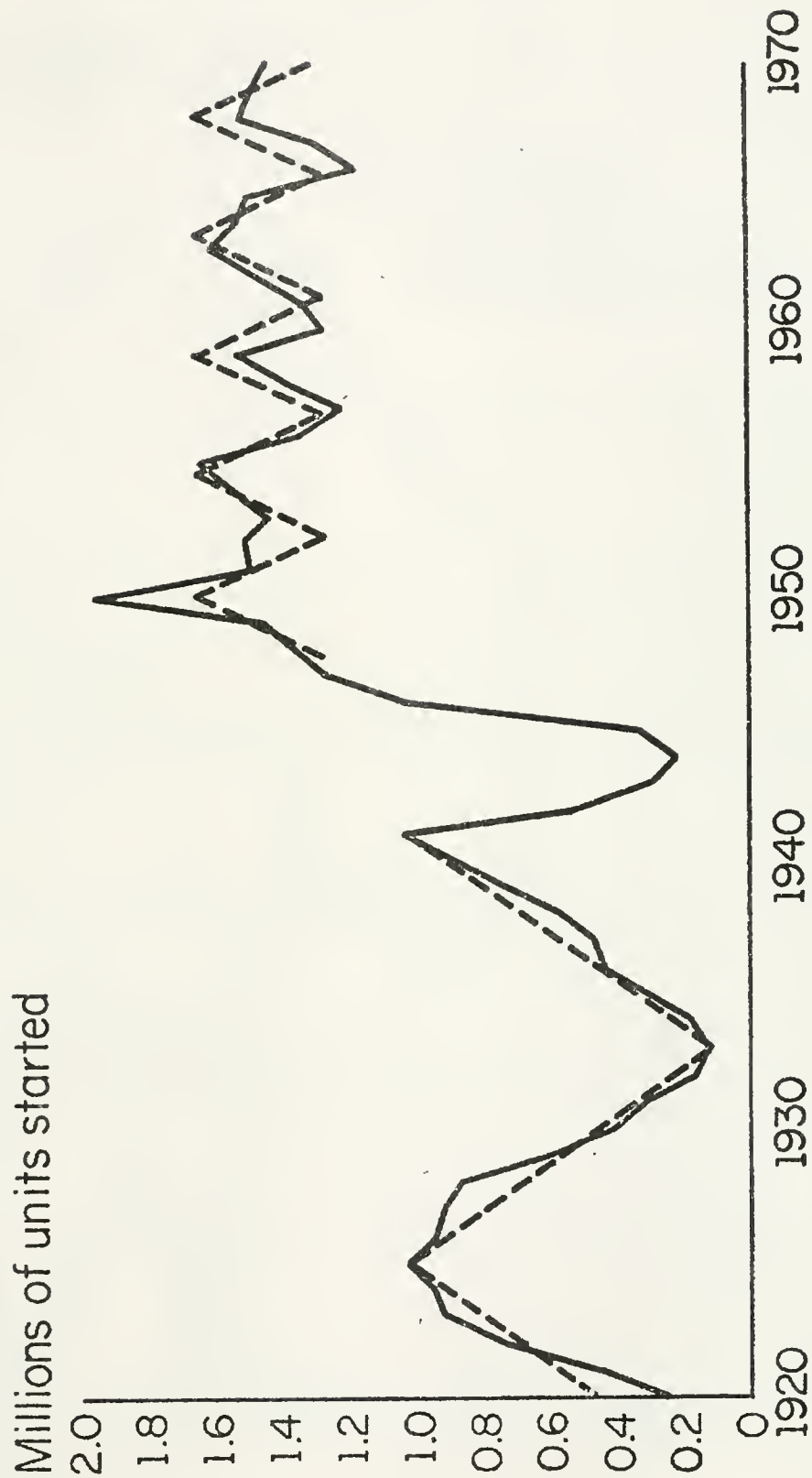
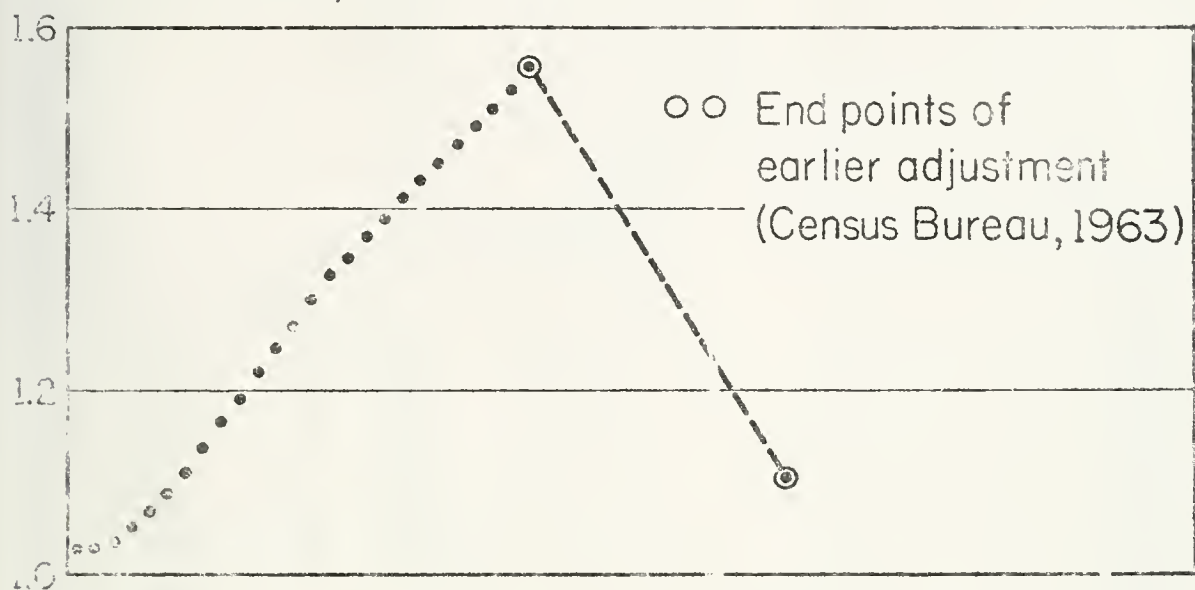


Chart 2 Nonfarm Housing Starts, 1920-1969

Correction ratios, 1920-1945



Millions of units started

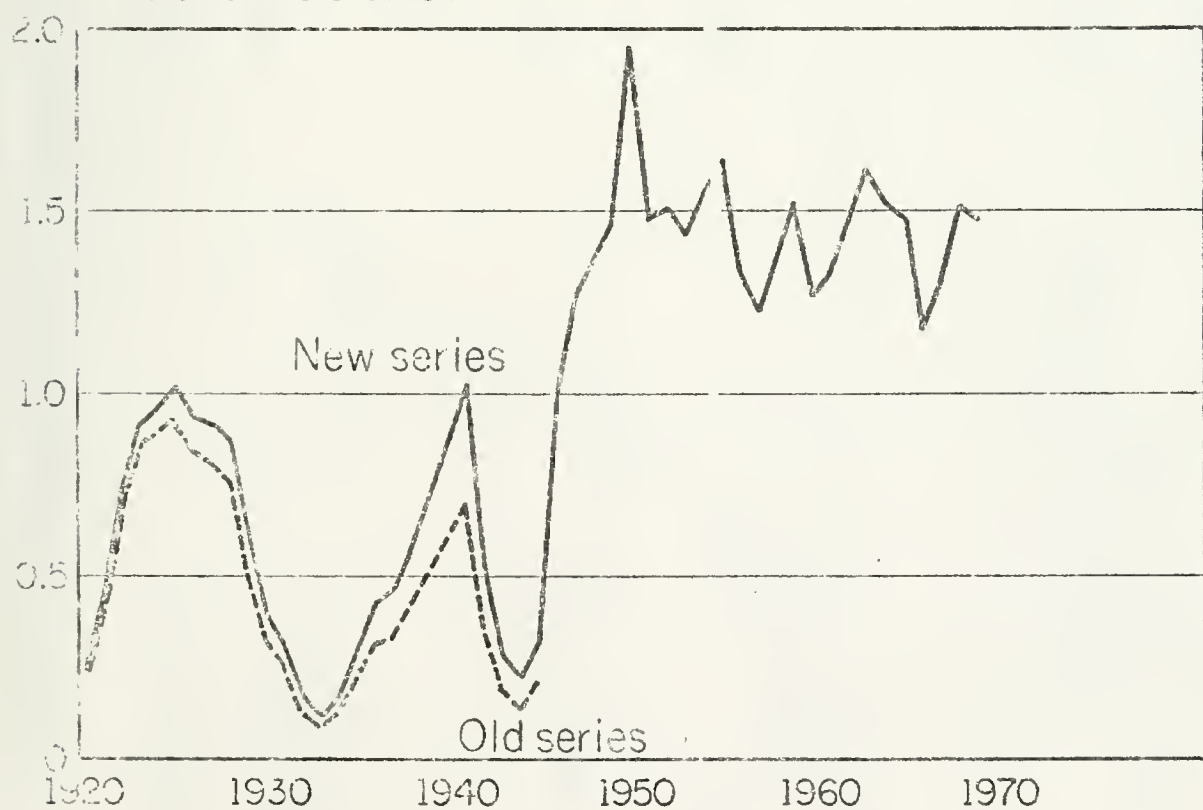


Chart 3 Selected Components of Change in the Nonfarm Housing Stock, 1920-1969

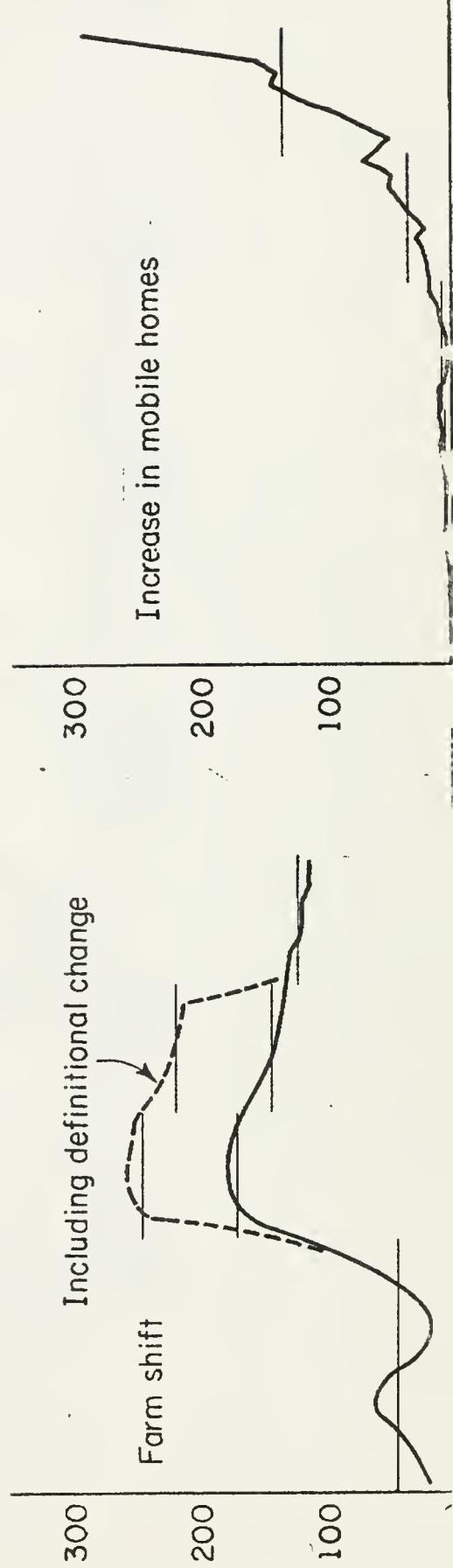
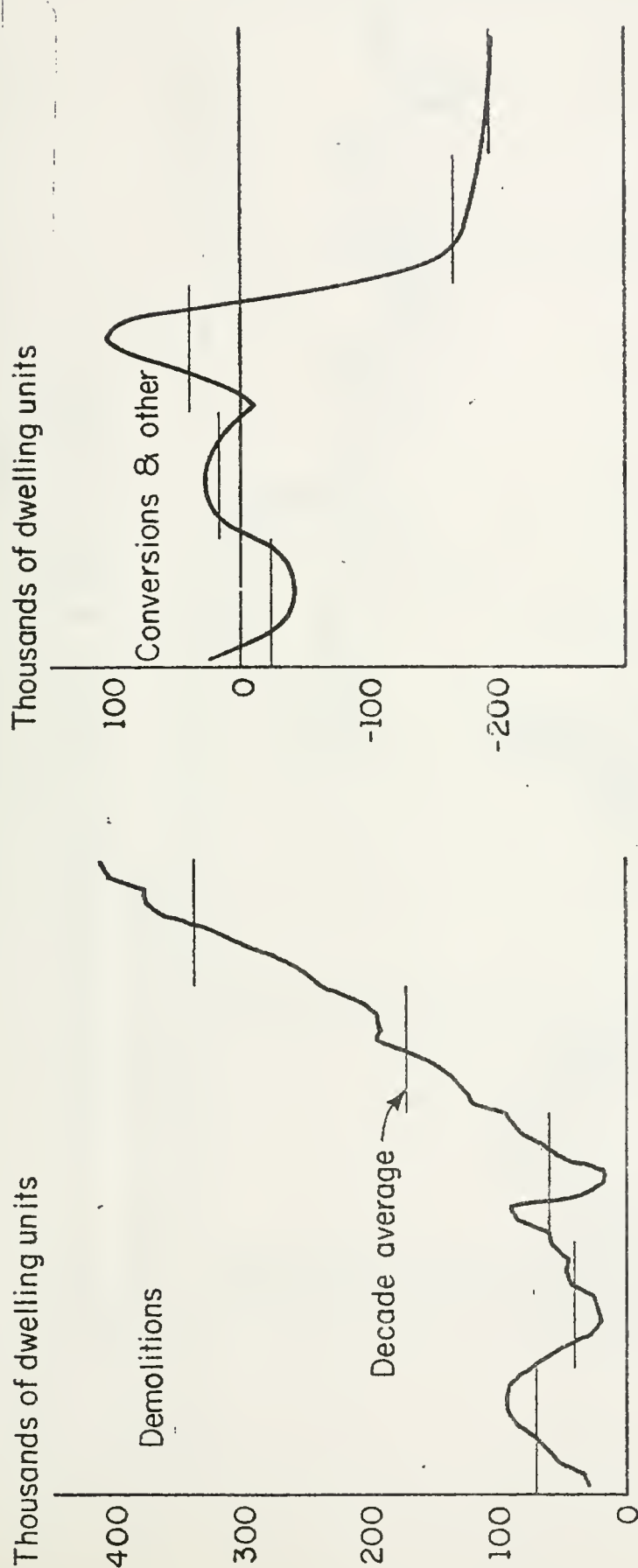
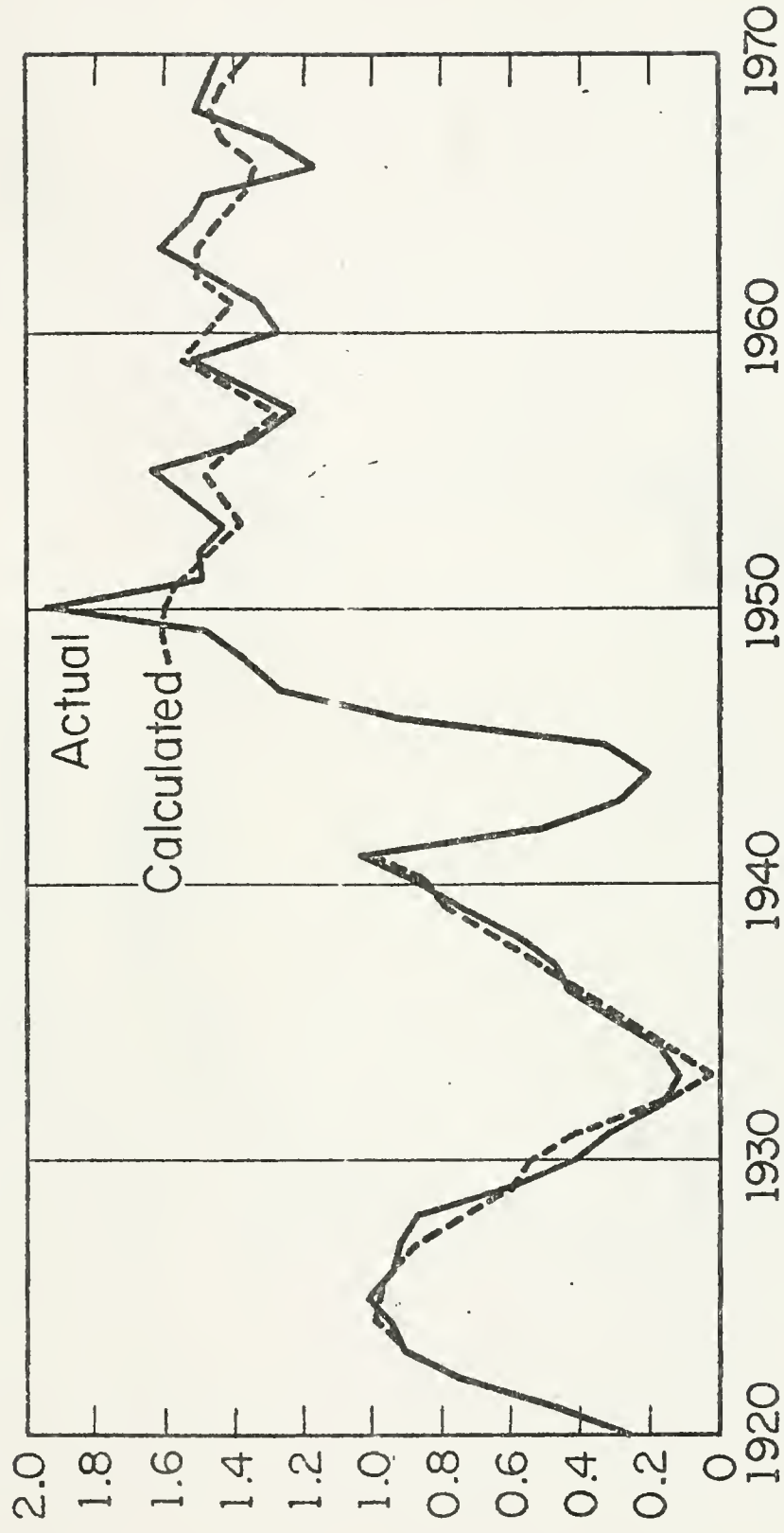
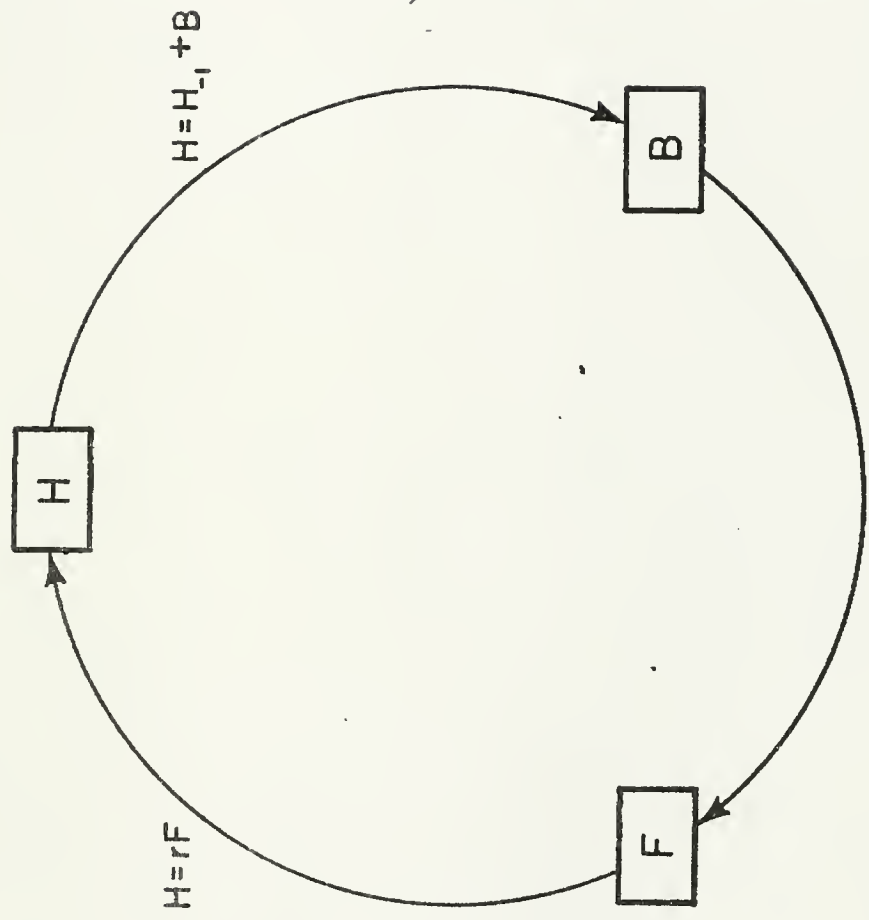


Chart 4 Nonfarm Housing Starts, 1920- 1970

Millions of units started



The Basic Housing Cycle



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